Bottom-up rehabilitation in schizophrenia

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7. Methods.

7.1 Aims of the study.

The present study aims to determine the effect of the clinical rehabilitation programme with regard to cognitive functioning, coping, competence of social skills, general behaviour, symptoms and resettlement. The additional value of cognitive training in the rehabilitation process of schizophrenic patients is established. Results will be assessed up to one year after the programme.

In order to determine the additional value of the programme, results are compared with the effects of traditional long stay wards and with drop-outs from the present study. Consequently, the study includes two control conditions.

In order to determine the additional value of cognitive training, the rehabilitation programme has been implemented in two conditions, as presented in the previous chapter. In the first condition the individual cognitive training is added to the standard programme. In the standard condition, this training has been replaced by a placebo training (extra counselling).

7.2 Subjects.

Patients were admitted to the rehabilitation ward and selected from the long stay control wards if they met the following criteria:

Inclusion Criteria:

- age $\geq$ 18 and $\leq$ 65.
- schizophrenia according to DSM-III-R criteria.
- admission indicated for long stay wards / institutionalization.
- voluntary participation in the programme and assessments.

Exclusion Criteria:

- involuntary commitment or refusal to participate in the programme.
- drug or alcohol abuse.
- frequent self-mutilating behaviour.
- mental retardation (premorbid IQ < 70).
- organic brain dysfunction.

Potential participants who were severely psychotic at the time of application were not refused, but placed in an 'inflow department' where the psychosis was primarily treated with antipsychotic medication, before the participant could enter the programme.

Ten groups of maximum eight subject were admitted to the rehabilitation ward and studied in the present study. In order to reduce the confounding effect of professional 'experience' in rehabilitation methodology as much as possible, individual cognitive skills training was given to the patients admitted to the first, third, fifth, seventh and ninth group.

The following criteria were formulated for exclusion after starting the programme (drop out):

- Change of antipsychotic medication.
- Participation < 75% of sessions.
- Refusal to participate further in the programme.
- Refusal to participate further in assessments.

Twenty-four participants participated in less than 75% of the sessions, leaving fifty-four patients in the study (Rehabilitation, condition 1). Twenty-seven of these patients participated in the cognitive skills training condition (CST; condition 1a), and twenty-seven participated in the standard condition of the programme (Standard; condition 1b). All twenty-four subjects in the drop-out condition (Drop-out1; condition 2) participated in the programme for less than 75%. Ten drop-outs left the programme and were dismissed from the ward before the end of the first stage of the programme. Motivations for leaving were:

- Experiencing the programme as too strenuous (1 patient).
- Being the only female in the group (1 patient).
- Involuntary admission to a closed ward following severe psychotic decompensation and leaving the hospital (1 patient).
- Assignment of a housing facility (1 patient).
- Involuntary dismissal after drugs dealing and stealing (1 patient).
- Feeling no need to continue following the conception of 'recovery' (5 patients).

During the second stage none of the patients left the programme. Fourteen patients participated for less than 75% but did not leave the programme. Not reaching the 75% criterium was due to:

- Severe psychotic symptoms; mainly delusions of reference and incoherence, followed by change of neuroleptic medication in five cases (7 patients).
- Preferring a more or less passive 'self designed' programme (7 patients).

Nine of the fourteen drop-out patients who did not leave the programme completed the assessments necessary for evaluation. Consequently, in the final analyses the rehabilitation condition is compared to nine drop-out patients (Drop-out2, condition 2a).

The long stay control group has been selected from two long stay wards (Delta Ziekenhuis, Poortugaal and I.P.Z. Noord-Oost Brabant, Huize Padua). Seventeen patients completed both assessments (interval eight months). These patients include the long stay control condition of this study (Control, condition 3).

Table 7.1: Demographics of participating patients (n=95).

Conditions	1	2	1a	1b	2a	3
N =	54	24	27	27	9	17
Sex:						
male	42	19	22	20	7	12
female	12	5	5	7	2	5
Referred from:						
Family	7	1	4	3	0	0
Sheltered accommodation	2	0	2	0	0	0
Admission ward	45	23	21	24	7	0
Long stay ward	0	0	0	0	0	17
Age in years:						
mean	29.6	30.4	31.6	27.7	33.4	39.2
s.d.	7.0	6.5	7.4	6.1	8.6	8.9
range	19-47	23-51	22-47	19-44	23-51	27-57
Duration of illness (in years):						
mean	7.0	9.1	7.7	6.4	12.8	15.5
s.d.	4.2	6.4	4.7	3.5	8.6	7.5
range	2-24	2-30	2-24	2-16	4-30	4-31
Prior admissions:						
mean	3.4	4.4	4.1	2.6	4.8	3.5
s.d.	2.6	3.2	3.1	1.8	3.1	2.9
range	0-13	1-14	0-13	1-8	1-9	1-11
Level of education:						
mean	4.9	5.0	4.8	4.9	5.1	4.8
s.d.	0.9	1.0	1.0	0.7	1.1	1.3
range	3-7	3-6	3-7	4-7	3-6	2-7

1 = Rehabilitation condition
1a = CST condition
1b = Standard condition
2 = Drop-out1 (all drop-outs)
2a = Drop-out2 (drop-outs who completed both assessments)
3 = Control

In table 7.1, the demographics of all participating patients are presented. In order to determine whether drop-outs differ from non-drop-outs, the rehabilitation condition (CST and Standard, condition 1) and all drop-out patients (condition 2) are presented in the first two columns. In the third and fourth column the data of the CST and Standard condition (conditions 1a and 1b) are presented separately. The fifth column includes the

nine drop-outs who finished both assessments (condition 2a) and the final column includes the data of the control subjects (condition 3). Concerning the level of education, a 7-point scale ranging from unfinished elementary school (1) to university (7) was used. The duration of illness was established by subtracting the age at which psychotic symptoms first were recorded (in the medical dossier) from the actual age.

In most of the cases in the rehabilitation and drop-out conditions patients were recently hospitalized before entering the programme. Eight patients had lived with their families before entering the rehabilitation programme. In those cases the family could no longer sustain in the care for the patient. Two patients had been referred from a sheltered living situation to improve their skills at the rehabilitation ward. Their place was kept free until the end of the programme.

To identify differences between the rehabilitation condition and all drop-outs (n=24), sex and source of reference have been compared with the Chi-Square (X^2) test for association. Age, duration of illness, prior admissions and level of education have been compared with a oneway analysis of variance. No significant association or difference was found on any variable. So being a drop-out is not dependent upon sex, source of reference, age, duration of illness, prior admissions or level of education. In the next chapter, it will also be determined whether drop-outs differ from non-drop-outs at the first assessment on any outcome variable of the present study.

In the present study, two comparisons are made. First, to determine the effect of the programme, results of the rehabilitation condition (condition 1) have been compared with the results in the drop-out and control conditions (condition 2a and 3).

The differences between condition 1, 2a and 3 have also been calculated with the Chi-Square (X^2) test for association (concerning sex) and oneway analysis of variance (Scheffé range test). No dependency was found between sex and conditions ($X_{(2)} = 0.38$, n.s.). Comparing the means of age, duration of illness, prior admissions and level of education, it appears that patients in the rehabilitation condition are younger compared to the control condition ($F_{(2,77)} = 10.34$, $p<.001$). Also, patients in both the rehabilitation and drop-out condition have shorter duration of illness in comparison with the control condition ($F_{(2,77)} = 16.41$, $p<.000$). This result warrants that age and duration of illness have to be used as covariates in the multivariate analyses in comparing the rehabilitation condition to the drop-out and control conditions.

The second comparison concerns the additional value of cognitive skills training. Therefore, the cognitive skills training condition (1a) and the standard condition (1b) have been compared. Comparing the demographics of conditions 1a and 1b it appears that patients in the cognitive skills training condition are significantly older ($F_{(1,52)} = 4.42$, $p<.05$) and have more prior admissions ($F_{(1,52)} = 4.98$, $p<.05$) compared to patients in the standard condition of the programme. So, age and prior admissions have to be used as covariates in analyses comparing the cognitive skills training condition and the standard condition of the programme.

7.3 Assessment.

In chapter 5 an extensive battery of tests and tasks that operationalize the theoretical starting points of this study, have been studied and described in order to select

reliable instruments. Results presented in table 5.3 and 5.4 show that the following instruments measuring cognitive functioning, are reliable: The vigilance score of the Continuous Performance Test (CPT-d'); the WAIS Digit Span (DIGITS), measuring reproduction of declarative information, and; the amount of steps necessary to complete the three disk trials of the Tower of Hanoi (HANOI), measuring proceduralization. The perseveration score of the Wisconsin Card Sorting Test (WCST-P), measuring adequate use of feedback, has only been administered at the first assessment to be included in the analysis on the prediction of success (section 7.5.3.).

The degree in which participants use a problem oriented-coping style when faced with problems or tension is measured with the problem-solving subscale of the Utrechtse Coping Lijst (UCL-P).

Competence of social skills performance is measured with the Simulated Social Interaction Test. Two scores are administered; competence of performance (SSIT-C) and using W-questions as a reaction to prompts (SSIT-W).

General functioning is measured with the general behaviour subscale of the Rehabilitation Evaluation Hall and Baker (REHAB).

Positive and negative symptoms of schizophrenia are scored using the Schizophrenia Subscale of the Comprehensive Psychopathological Rating Scale (CPRS-SS), and the Scale for the Assessment of Negative Symptoms (SANS).

Finally, to establish the long term effects of the rehabilitation programme, accommodation and daily activities will be determined. Accommodation is rated using six categories: (1) independent living, (2) living with family, (3) 'sheltered' living together with other 'ex-patients' with relatively little professional assistance, (4) 'waiting' at the 'outflow' department (see section 7.4), (5) long stay ward, and (6) re-admission.

Daily activities are rated using five categories: (1) paid employment outside the clinic, (2) unpaid, but regular employment outside the clinic, including primary responsibility for housekeeping if patients have a family, (3) study, (4) regular 'work' inside the clinic, and (5) no regular activities besides housekeeping tasks.

Patients participating in the rehabilitation programme have been assessed five times: After initial assessment prior to the programme (T1), patients are re-assessed after the first stage of the programme (T2), and after the second stage (T3). Six months after leaving the programme, the first follow-up is held (T4). For practical reasons it was not possible to include the SSIT in this assessment. Twelve months after completing the programme, the final assessment is held (T5). This assessment includes the CPRS-SS, SANS, REHAB, accommodation and daily activities.

Patients participating in the long stay control condition have been assessed two times with an interval of eight months. Twelve months after the second assessment, accommodation and daily activities have been assessed.

Tests and tasks were administered by trained clinical psychology students. Interviews were held by a trained clinical psychologist. The REHAB was rated by psychiatric nurses. If patients were not hospitalized or were living 'sheltered' at the follow-up, significant others (especially family members) were interviewed by a clinical psychologist to obtain a representative score.

7.3.1 Assessment of syndromes of schizophrenia.

As described in chapter two, factor analysis of symptoms of schizophrenia repeatedly results in three symptom factors. These 'syndromes of schizophrenia' are (1) reality distortion, (2) disorganisation and (3) the psychomotor poverty syndrome (Liddle et al., 1994). Buchanan and Carpenter (1994) examined the validity of these syndromes by reviewing fifteen studies on the symptom structure in schizophrenic patients. The majority of studies reported the presence of these three factors. The evidence for the validity of separating schizophrenic symptomatology into discrete symptom complexes is most robust for reality distortion (delusions and hallucinations) and the psychomotor poverty syndrome (poverty of speech, anhedonia and affective flattening). Disorganization (especially positive formal thought disorder) is identified as a third independent category. The first factor has no association with cognitive disturbances. The second factor is associated with disturbances which are characterized by diminished processing speed and capacity. The third factor is most strongly related to cognitive disturbances, especially distractibility and poor performance on the language, memory, attentional and planning functions.

Besides statistical validity, the identification of the three factors is also considered clinically significant. For example, Hogarty and Flesher (1992) suggest an individually tailored cognitive restructuring approach for schizophrenia including one basic intervention for each factor: 'reinforcement of psychomotor activity in general' to treat the poverty syndrome, 'training executive control' in case of profound disorganization, and 'elaboration of cognitive sets' to reduce distortion of reality.

In the present study the Schizophrenia Subscale of the Comprehensive Psychopathological Rating Scale (CPRS-SS) and the Scale for the Assessment of Negative Symptoms (SANS) are used to identify positive and negative symptoms of schizophrenia. Most of the studies reviewed by Buchanan and Carpenter (1994) also include the SANS. However, only one study includes the CPRS-SS.

In order to obtain scores on the three symptom factors, SANS- and CPRS-SS items at the first assessment of all participating patients (n=96) are analyzed using a principal component analysis. SANS items concerning affective flattening, alogia, avolition, anhedonia and attentional impairment were included (see table 7.2; 's' items). The 'global rating' items are excluded as they represent an overall rating per dimension and consequently will be highly positively related to the other items that constitute each dimension. The review of Buchanan and Carpenter is used to select CPRS-SS items. If their study included a CPRS-SS item, it has also been incorporated in the present analysis. Twelve out of the seventeen items are included (see table 7.2; 'c' items). Derealisation, depersonalisation, hallucinatory behaviour, black outs and muscle tensions are excluded. Finally, the SANS item (6) 'inadequate affect' is excluded because of high conceptual overlap with the CPRS-SS item 'discongruent emotions'.

Before analyzing the 31 items, the score ranges have been adjusted to obtain comparable values at each item. Each original CPRS-SS item is rated using a 4-point Likert-type scale ranging from 'absence of the symptom' (0) to 'extreme occurrence of the symptom' (3). Each original SANS item is rated on a 6-point Likert scale ranging from 'absence of the symptom' (0) to 'extreme occurrence of the symptom' (5). To obtain equal values, SANS scores are transformed into the CPRS-SS score format (SANS 0 = 0; SANS

1,2 = 1; SANS 3 = 2; SANS 4,5 = 3).

In table 7.2 the results of the principal component analysis with the SANS and CPRS-SS items are presented. Preceding the varimax rotation the amount of factors to be extracted is fixed at three. Items are selected to include the factors if (1) factorloading is at least .40 and (2) the difference between loadings on two factors is at least |.20|. Selected items are printed in boldface.

Table 7.2: Factor Analysis on SANS and CPRS-SS items (n=96).

Item:	Factor 1	Factor 2	Factor 3
s1: unchanging facial expression	.77	.04	.18
s2: decreased spontaneous movements	.65	-.07	.03
s3: paucity of expressive gestures	.83	-.04	.04
s4: poor eye contact	.44	.15	.00
s5: affective non-responsivity	.65	.24	.18
s7: vocal inflections	.70	-.09	.18
s10: poverty of speech	.72	.09	-.16
s11: poverty of content of speech	.09	.79	.20
s12: blocking	.45	.38	.01
s13: increased latency of response	.47	.31	-.05
s16: grooming and hygiene	.42	.38	.28
s17: impersistence at work or school	.54	-.02	.13
s18: physical anergia	.63	-.02	.20
s21: recreational interests	.70	.04	-.05
s22: sexual interests	.48	-.03	.17
s23: ability to feel intimacy/closeness	.59	.06	.06
s24: relationships with friends or peers	.54	.23	-.12
s27: social inattentiveness	.14	.64	.09
s28: inattentiveness during testing	.09	.23	-.07
c3: feeling controlled	.08	.00	.68
c4: disrupted thoughts	.27	-.01	.58
c5: ideas of persecution	-.02	.03	.50
c6: delusions of reference	-.03	.01	.33
c7: other delusions	-.03	.32	.29
c8: commenting voices	.07	.20	.62
c9: other auditory hallucinations	.10	.14	.80
c10: other hallucinations	.24	.06	.63
c11: discongruent emotions	.37	.63	-.01
c12: diminished understanding of speech	.07	.77	.07
c14: incoherent speech	-.22	.80	.27
c16: mannerisms	-.00	.45	.15
Eigenvalue:	7.12	3.87	2.55
Explained variance:	25.2%	18.5%	10.0%
Cronbach's Alpha:	0.88	0.83	0.75

Factor 1 : Psychomotor poverty
Factor 2 : Disorganization
Factor 3 : Reality distortion

The first factor includes unchanging facial expression, decreased spontaneous movements, paucity of expressive gestures, poor eye contact, affective non-responsivity, vocal inflections, poverty of speech, impersistence at work or school, physical anergia,

recreational interests, sexual interests, ability to feel intimacy and closeness, and relationships with friends or peers. This factor has high eigenvalue (7.12), explains 25.2% of variance, and has high internal consistency (Cronbach's Alpha = .88). This factor corresponds with the psychomotor poverty syndrome.

The second factor includes poverty of content of speech, social inattentiveness, discongruent emotions, diminished understanding of speech, incoherent speech, and mannerisms. Eigenvalue is 3.87, percentage of explained variance is 18.5, and internal consistency is also high (α=.83). This factor corresponds with disorganization.

Finally, the third factor includes positive symptoms such as feeling controlled, disrupted thoughts, ideas of persecution, commenting voices, other auditory hallucinations, and other hallucinations. Eigenvalue is 2.55, explained variance is 10.0%, and Cronbach's Alpha is satisfactory (.75). The third factor corresponds with reality distortion. Together the three factors explain 53.8% of variance.

In summary, in the present study the same positive and negative symptoms as reviewed by Buchanan and Carpenter (1994) constitute the 'three syndromes of schizophrenia'. Consequently, to evaluate the effects of the treatment the SANS- and CPRS-SS items will be transformed into the psychomotor poverty scale (POV), the disorganization scale (DIS) and the reality distortion scale (REA). POV, DIS and REA are used to evaluate the results of the present study.

7.4 Design and procedure.

The rehabilitation programme was carried out in a twenty-bed ward. Sixteen beds were allocated to the rehabilitation programme, and were divided between two groups of eight participants. The remaining four beds were used for in- and outflow patients. The outflow beds were for use by patients ready to leave the clinic, but for whom there was no protected living situation available, nor any other housing facilities.

As the programme includes two stages of four months each, every four months a new group of maximal eight participants was admitted to the rehabilitation ward. After finishing the first stage, the first group was tested and started the second stage while the second group was admitted, tested and entered the first stage. Again after four months, the first group was tested and discharged, the second group was tested and went on to the second stage while the third group was admitted, tested and entered the first stage etcetera. All patients were informed about the aims of the study and in all cases informed consent was obtained. If possible, during the experimental period neuroleptic medication remained unchanged. If a change in antipsychotic medication was necessary, the subject dropped out of the study but the programme was continued.

At the first follow-up, participants visited the rehabilitation ward to participate in the assessment and were interviewed. At the second follow-up the patients were interviewed in their homes.

Subjects from the long stay ward control condition, were also informed about the aims of the study and also in all cases informed consent was obtained. Control subjects were given payment for their participation (50 Guilders per assessment). The test results were reported on request. Overall, it took 55 months to collect all data.

7.5 Hypotheses and Questions.

7.5.1 Hypothesis on the effect of the programme.

The present study deals with the controlled evaluation of the rehabilitation programme as described in chapter six. Assessments were made up to one year after the programme. The evaluation of the programme is aiming at different levels of functioning. Variables range from cognitive functioning to accommodation and daily activities.

On theoretical grounds the variables are clustered into seven categories. A positive result on each category is considered to represent an important target of the rehabilitation programme:

1. Cognitive organization: This category represents variables related to the organization of information processing. Variables including this category are reproduction of declarative information (DIGITS), proceduralization (HANOI) and disorganization (DIS). The latter is included since it is repeatedly demonstrated that the disorganizational syndrome is strongly associated with cognitive disturbances, especially distractibility and poor performance on the language, memory, attentional and planning functions (Buchanan & Carpenter, 1994). This category does not include the Continuous Performance Test (CPT-d'). The stability of this variable will be tested separately.

2. Coping: Problem-oriented coping (UCL-P) is identified as an independent category since it is the only (theoretical) representation of behaviour consequent upon the subjective evaluation of stress.

3. Social skills: The specific competence on social skills is identified as the third category. Measures that operationalize this category are derived from the Simulated Social Interaction Test and include competence of social skills (SSIT-C) and asking W-questions as a reaction to prompts (SSIT-W).

4. General functioning: This category includes variables operationalizing the general level of activity and behaviour of patients. General behaviour (REHAB) and the poverty syndrome (POV) constitute this category.

5. Psychotic symptoms: Positive symptoms of schizophrenia, delusions and hallucinations, are operationalized by reality distortion (REA). This variable is identified as an independent category.

6. Accommodation: Since optimal resettlement includes accommodation outside the hospital, this variable is included as an independent category.

7. Daily activities: The same holds for 'work'. Performing structural daily activities outside the clinic is believed to increase the quality of general functioning and resettlement.

Although some of the categories may be related, it is not preferred here to further identify factors of 'underlying' constructs.

To identify the effect of the programme three groups of patients will be compared: (1) patients who participated in the rehabilitation programme (condition 1; n=54), (2) drop-outs (patients who participated in the programme for less than 75% but completed the first and third assessment; condition 2a; n=9), and (3) patients who participated in the traditional long stay ward programmes (Condition 3; n=17). Since being a 'drop-out' could only be determined after the programme, and considering that only two assessments have been made in the control condition (with an interval of eight months), this comparison includes the total programme and does not differentiate between the two stages. At the one year follow-up, the differences between the conditions with regard to accommodation and daily activities will be determined.

During the rehabilitation programme patients are stimulated to formulate their own goals with regard to resettlement. They are encouraged to distance from the 'patient role' and to regain control. In other words, the programme may be regarded as an exposure treatment to the individual responsibility of patients to activate their 'healthy' parts, and as an expedient to develop the skills necessary to live as independently as possible. The programme enables patients to stop restricting their frame of reference to 'psychiatry' and to broaden it to society in general. Therefore, it is assumed that the programme will have a general and positive effect on the patients' functioning. Having the opportunity to prevent (further) hospitalization is believed to effect a patient's motivation positively. The supposition is that it will lead to the activation of all residual capabilities. Consequently, the general hypothesis of the present study is:

Hypothesis 1: Patients who have participated in the rehabilitation programme will improve more on every outcome category compared to patients who have dropped out of the programme or have participated in a traditional long stay ward programme.

7.5.2 The additional value of cognitive skills training.

Besides the general effect of the programme, the main question in this study is whether cognitive skills training has additional value to a training methodology which takes into account the presence of cognitive disturbances. In order to answer this question, patients who participated in the cognitive skills training condition (condition 1a), will be

compared to patients who participated in the standard condition of the programme (condition 1b).

Until now, no study has explicitly studied the additional value of cognitive skills training additive to the results of a rehabilitation programme as applied in this study. Considering that this programme includes many skills trainings which methodologically take into account the presence of cognitive disturbances, it may be argued that the cognitive skills training is given 'no fair change' to prove its effect. However, if disturbed cognitive functioning has a pervasive character (Saccuzzo & Braff, 1981) and consequently, remediation of these disturbances is a prerequisite to profit from other trainings, then patients who participate in the standard programme will profit less from the trainings, compared to patients who also receive cognitive skills training.

The present study was initiated in 1989. From 1990, some studies have shown that cognitive training does not remediate cognitive disturbances. Olbrich and Mussgay (1990), Van der Gaag (1992), and Benedict et al. (1994) demonstrated that controlled cognitive operations requiring mental effort benefit from training, whereas automatic aspects of information processing are not affected by cognitive training. Hodel (1993) showed that improvements in the patients' cognitive, social and clinical status were as great for patients who started with social skills training and then participated in cognitive skills training as vice versa. So, until now, as concluded by Van der Gaag et al. (1994), cognitive skills training seems to serve as an exposure treatment, helping patients to re-establish a more elaborate style of information processing. If this is true, then the cognitive skills training will not have additional value in the present study, considering that (as described in the previous section) the standard programme is also supposed to expose patients to residual abilities, including the possibility to elaborate a cognitive processing style.

In summary, on the one hand, no studies are known in which cognitive remediation has been compared to the methodological consideration of cognitive disturbances during rehabilitation. On the other hand, after the onset of the present study, some studies have showed that cognitive remediation is only possible with regard to controlled information processing. It was also pointed out that the order in which cognitive training is combined with other trainings does not affect the cognitive, social and clinical outcome. The latter finding strongly opposes the opinion that cognitive disturbances have a pervasive character. However, up to now, the findings have neither been replicated nor falsified.

Thus, the 'state of the art' in cognitive rehabilitation of schizophrenic patients is considered to be insufficiently clear to formulate hypotheses on the additional value of cognitive skills training additive to a 'standard' bottom up rehabilitation programme. The comparison of both conditions at every outcome category should lead to more elucidation (theoretical and empirical based hypotheses) of this matter.

The cognitive skills training condition and the standard condition of the programme will be compared at every assessment (T1-T5), including the follow-up results at six and twelve months after the programme.

7.5.3 Predictors of successful rehabilitation.

The three syndromes as identified in section 7.3 illustrate that schizophrenia is a heterogeneous mental disorder. In different degrees, patients suffer from reality distortion, and/or cognitive disorganization, and/or psychomotor poverty. As explained in section 1.3, the latter syndrome shows conceptual overlap with non-schizophrenic symptoms 'lower' in the diagnostic hierarchy, such as depression and anxiety. The conceptual overlap with grief was also explained.

In order to evaluate the results of the rehabilitation programme, an expansive testing-battery has been administered to the patients. Dependent variables include cognitive functioning, coping-style, social skills, general behaviour, syndromes of schizophrenia, accommodation and daily activities. Compared to the drop-out and control conditions, a significant better result on any variable in the rehabilitation condition is considered to represent a 'success' of the programme. If the rehabilitation programme leads to improved functioning on any variable, it is important to find out whether this improvement could have been predicted at the first assessment. The identification of 'predictors of success' may contribute to further improving or individually tailoring of the rehabilitation process of schizophrenic patients.

During the first stage of the programme the establishment of executive control is a key issue. The programme is directed at learning to accept and deal with vulnerability for psychotic decompensation, and at the step-by-step acquisition of basic skills. The gradual transition from controlled declarative knowledge to 'production systems' with automatized procedural knowledge, is central at this stage. Since controlled processing of information is held to be a prerequisite for the successful application of behaviourial skills, it is aimed during this stage to develop a stable foundation for social reintegration.

The second stage focuses on learning how to deal with external sources of stress, optimalizing self-care and social skills, seeking appropriate accommodation, and developing the skills necessary to live as independently as possible. Learning to perform 'survival skills' is essential at this stage. The programme enables patients to learn new skills and to re-activate the skills that have been extinguished because of hospitalization and a frame of reference that is restricted to 'psychiatry', 'the illness' or 'grief'.

If patients are unable to process information adequately and are unable to learn skills, it is supposed that the programme will be unsuccessful. The testing-battery includes the Continuous Performance Test (CPT-d') which is widely used to operationalize the 'stable vulnerability indicator of schizophrenia' (e.g. Nuechterlein et al., 1990). Not all schizophrenic patients perform poorly on this task. In the poor-performance group the course of schizophrenia proves to be unfavourable compared to the 'normal' performance group (Buchsbaum et al., 1990). Given this state of affairs, patients with poor performance on the CPT, are supposedly profiting less from rehabilitation efforts as the impaired response variability will disrupt the learning process despite the application of tactics as described in chapter 3, and despite individual motivation for resettlement. Thus, performance on the CPT-d' at the first assessment, is supposed to predict success of the programme. Regarding the CPT-d' score, two hypotheses are formulated:

Hypothesis 2a: CPT-d' score does not change as a result of the programme.

Hypothesis 2b: CPT-d' score predicts the success of the programme.

Besides the CPT-d' score, other variables may predict successful rehabilitation as well. Therefore, the results of the first assessment, including dependent and independent variables, are used to search for possible predictors of success during the first stage of the programme and during the programme as a whole. Results on the dependent variables at the second testing are used to identify predictors of success at the second stage of the programme.

7.6 Statistical procedures.

To test the differences between the conditions, results on all dependent variables (except accommodation and daily activities) will be compared with MANCOVA's; multivariate analysis of covariance. Regarding the comparison of the rehabilitation, drop-out and control condition, covariates include age and duration of illness. Age and prior admissions are included as covariates to compare the cognitive skills training condition and the standard condition of the programme. If demographic variables significantly correlate with dependent variables, these demographic variables are also included as covariates in the relevant analyses.

In every MANCOVA three main effects and one interaction effect will be calculated. The first main effect concerns 'condition' and indicates whether stable significant differences are present between the conditions. The second effect, 'regression', explains the amount of variance that is explained by the covariates. If differences between the conditions are explained by the covariates, this main effect is significant. The third main effect concerns 'moment'. For every moment of assessment, the mean score of all conditions is calculated and compared to the other moments of assessment included in the analysis. Consequently, a significant effect implies that overall, the conditions changed between the moments of assessment. The interaction effect 'condition x moment' signals whether fluctuations in the different conditions have different patterns. For example, a significant effect may imply that the first condition deteriorated, the second improved, and the third remained stable.

Since the main effect 'moment' concerns the mean scores on the conditions, it may be that a non-significant result conceals significant effects in one of the conditions. Therefore, to check the 'moment' result, univariate one-tailed T-tests will be performed to compare the moments of assessment for each condition separately. If interaction effects are significant, the univariate results will also be presented to check for changes in separate conditions.

The differences between the conditions concerning accommodation and daily activities are analyzed using crosstabs and the Chi-square (X^2) test for association.

The prediction of success at second and third assessment concerns the 54 subjects who participated in the rehabilitation programme. To search for possible predictors of success for each variable a meaningful 'unit of change' has to be formulated. Therefore, an

alternative of the standard or z-score formula is used. For every subject, the change between two assessments in each variable is expressed as a proportion of the standard deviation of all observations. Thus, the standard deviation of the mean score of the results at the first, second and third assessment (3x54 = 162 observations for each variable) is used. For example, the change between first and second assessment on the DIGITS-task is computed by dividing the difference between first and second assessment scores on DIGITS for every subject by the standard deviation of all 162 observations on the DIGITS task.

This procedure results in three new variables for each subject and every dependent variable: The adjusted improvement (the change between two assessments as a proportion of the standard deviation) during the first and second stage of the programme and during the total programme.

The prediction of success is calculated in two steps. Firstly, correlations are computed between each adjusted improvement score and all first (in case of improvement during the first stage and the programme) and second (in case of improvement during the second stage) assessment scores. Each variable which significantly ($p<.01$) correlates with a particular improvement score, is selected for further computation. Second, for each improvement score with stepwise multiple regression analysis the amount of variance explained by the selected variables is calculated. Thus, in each multiple regression analysis, the dependent variable is a particular improvement score and the independent variables are the first or second assessment scores which have a significant correlation with that improvement score.

A different technique is used to find out whether status of accommodation and daily activities can be predicted. With regard to accommodation, with oneway analysis of variance, first assessment scores of patients who are referred to housing facilities outside the clinic will be compared to the first assessment scores of patients who stay inside the hospital after the programme. The same procedure will be applied to differentiate patients who are referred to a 'working situation' outside the clinic from patients who have daily activities inside the clinic or no activities at all.